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Parquet et al.

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[54] **STABILIZER ASSEMBLY**

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[22] Filed: **Sep. 13, 1982**

[51] **Int. Cl.**[3] **E02F 9/00**

[52] **U.S. Cl.** **414/718**; 212/189; 280/765.1

[58] **Field of Search** 414/694, 718; 254/423–427; 280/763–766; 212/189; 180/199

[56] **References Cited**

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3,843,154	10/1974	Thompson	280/766.1
4,026,428	5/1977	Shumaker	414/694
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Primary Examiner—Robert J. Spar

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Attorney, Agent, or Firm—Dressler, Goldsmith, Shore, Sutker & Milnamow

[57] **ABSTRACT**

A stabilizer assembly for laterally supporting a construction vehicle of the type having a material handling implement. The preferred embodiments of the stabilizer assembly permit selective positioning of the outboard ends of the stabilizer arms over a wide range of positions from a position immediately adjacent the vehicle wheels and near the longitudinal center line of the vehicle frame to a position substantially outside of the wheels and farther from the longitudinal center line of the vehicle frame. The inboard ends of the stabilizer arms are pivotally secured to a stabilizer anchor which is transversely slidable relative to the vehicle frame on either side of the center line thereof. Various means are disclosed for positioning of the stabilizer anchor relative to the vehicle frame and for retaining the stabilizer anchor in such position.

4 Claims, 11 Drawing Figures

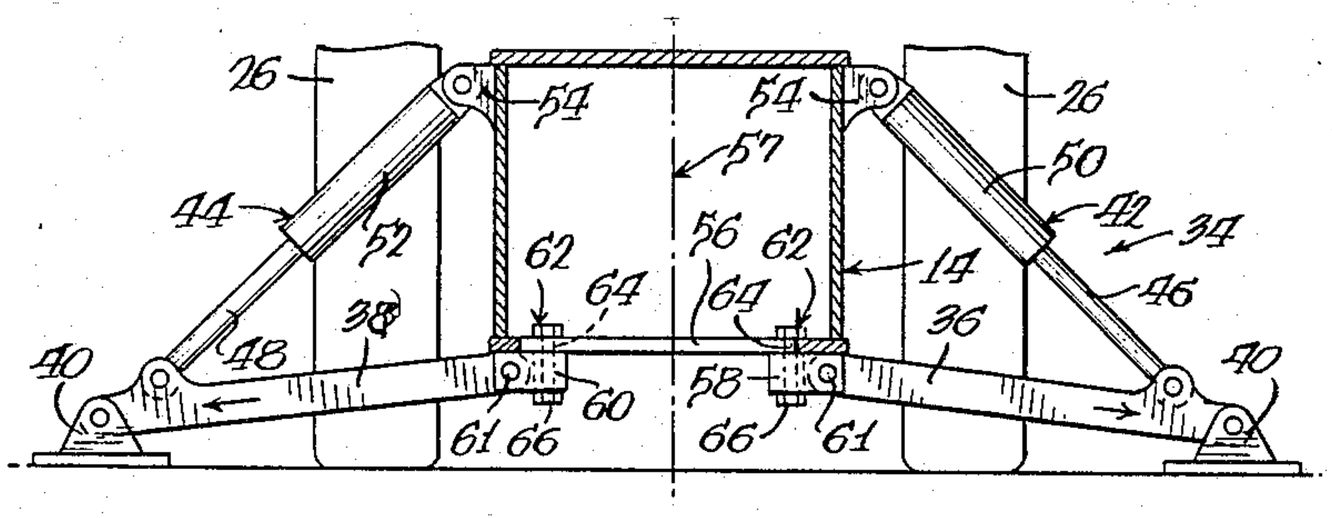

Fig. 1.

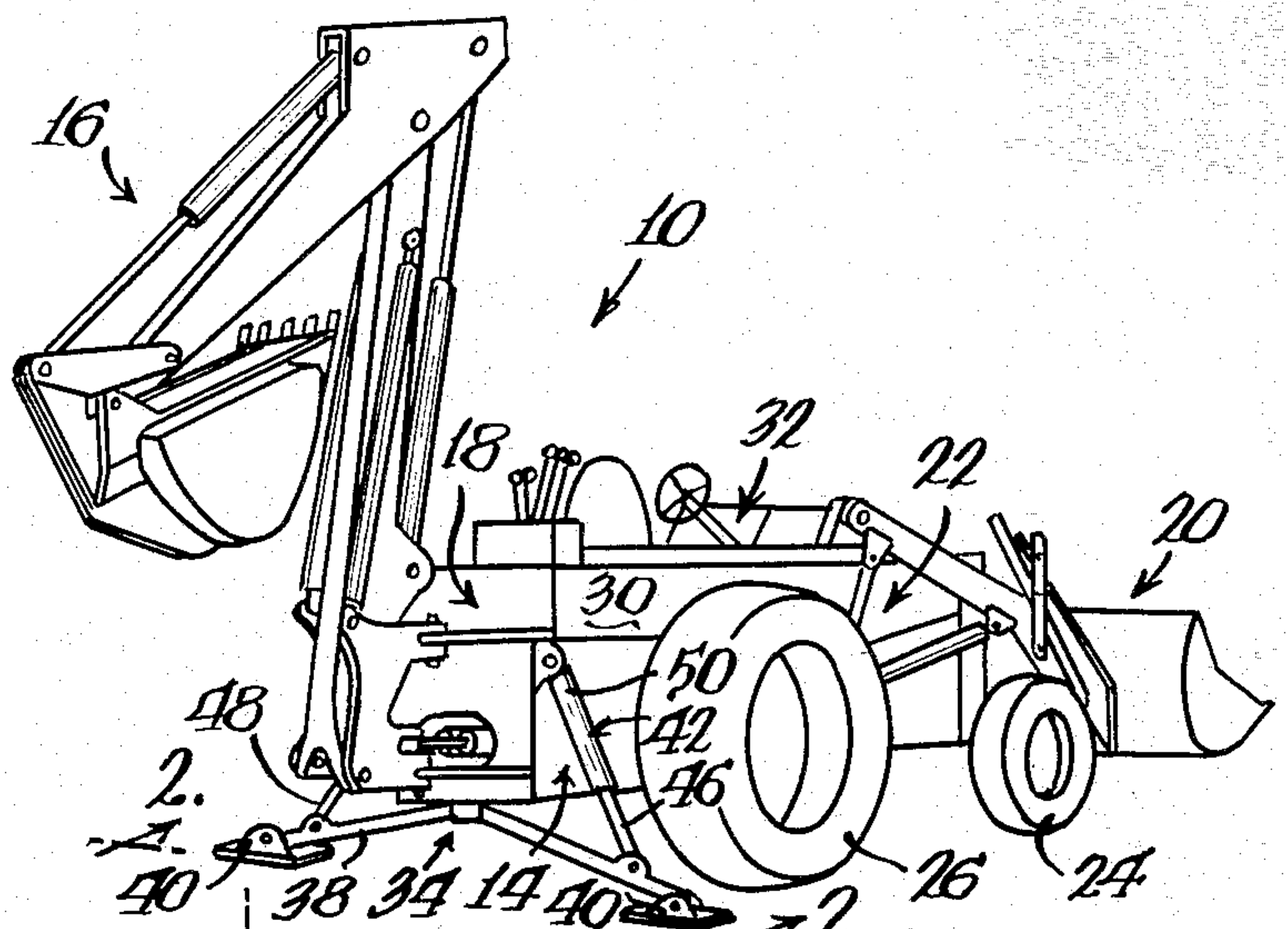

Fig. 2.

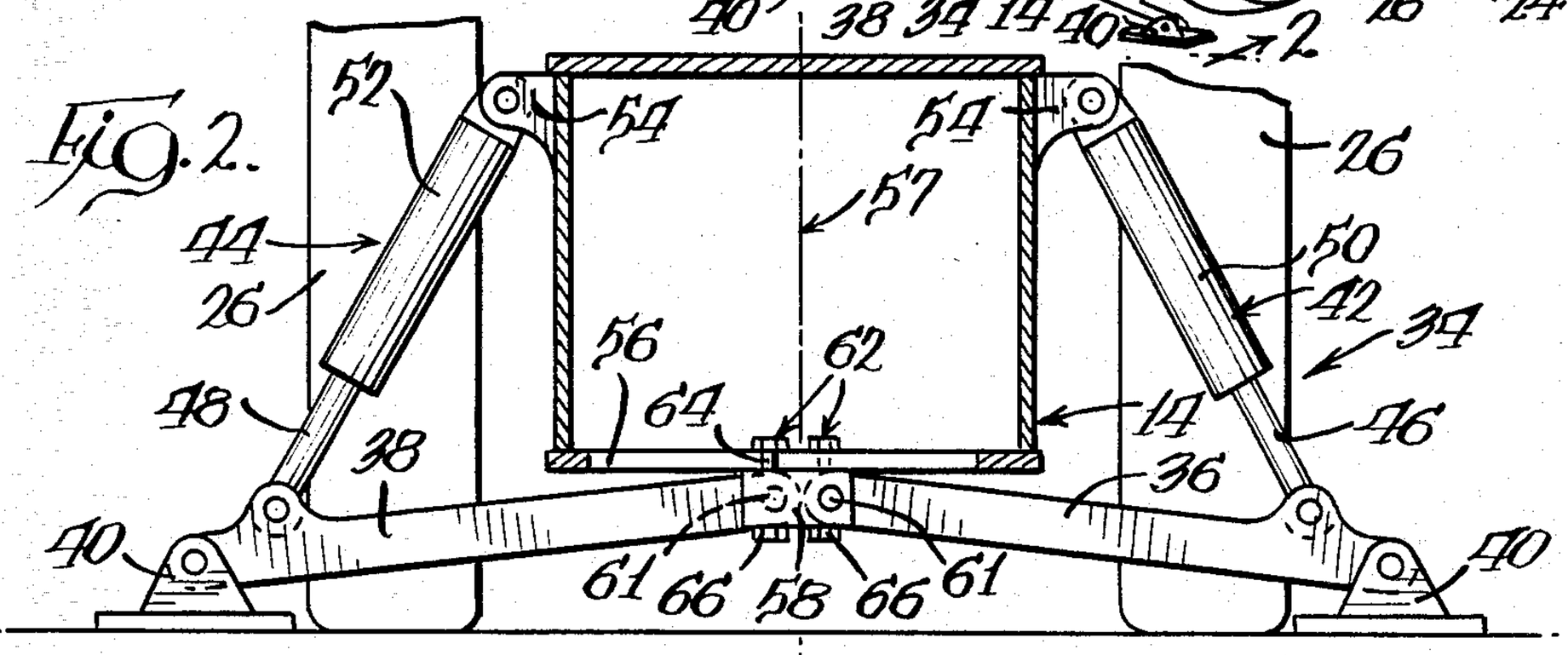

Fig. 3.

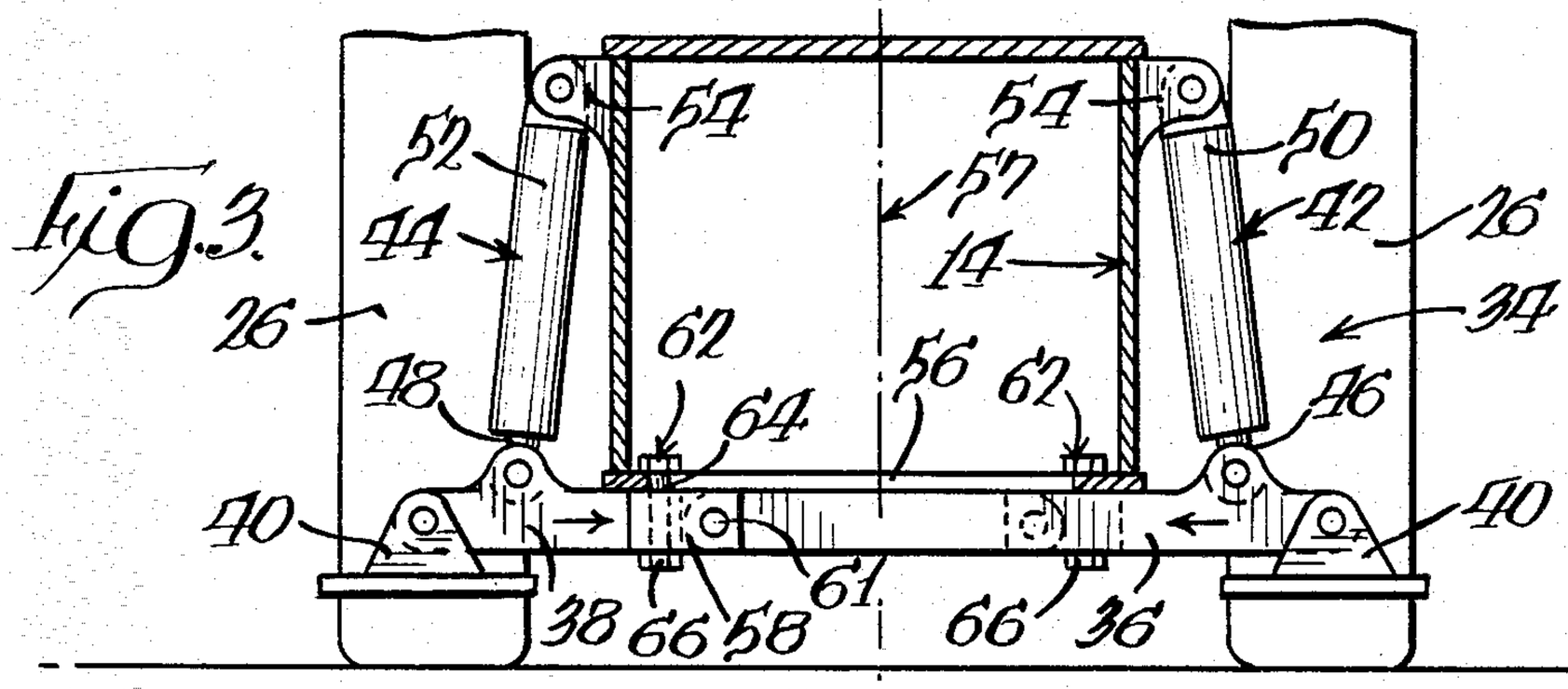

Fig. 4.

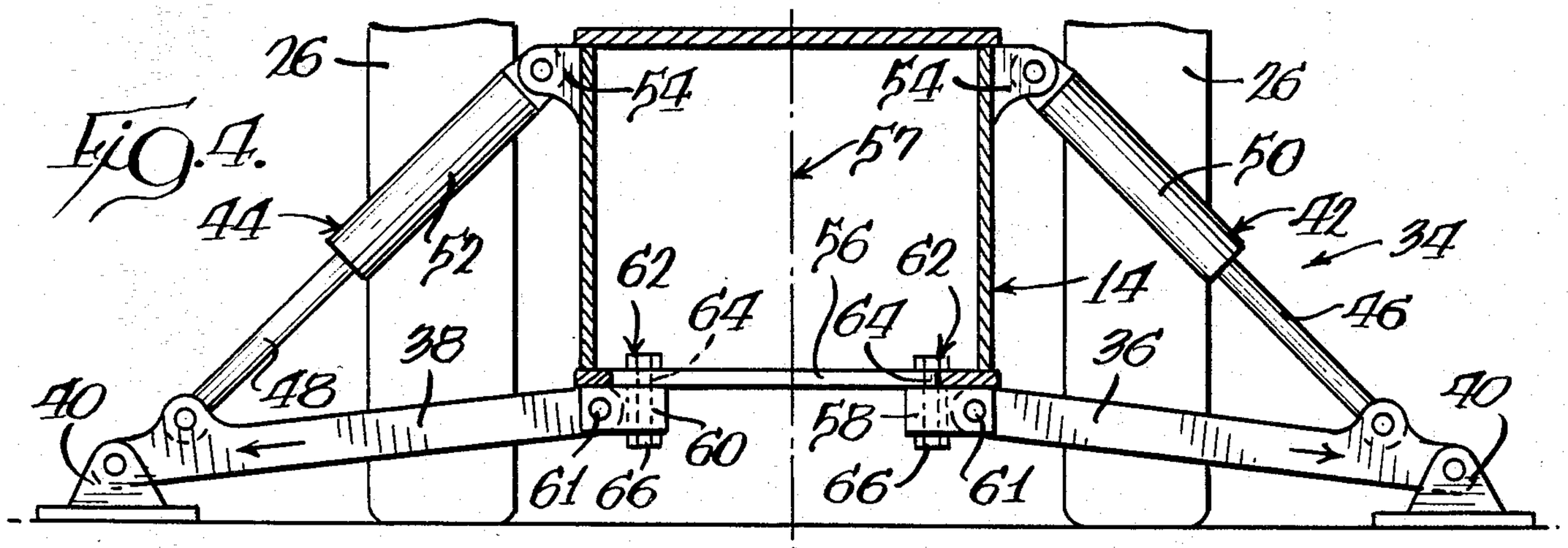

Fig. 5.

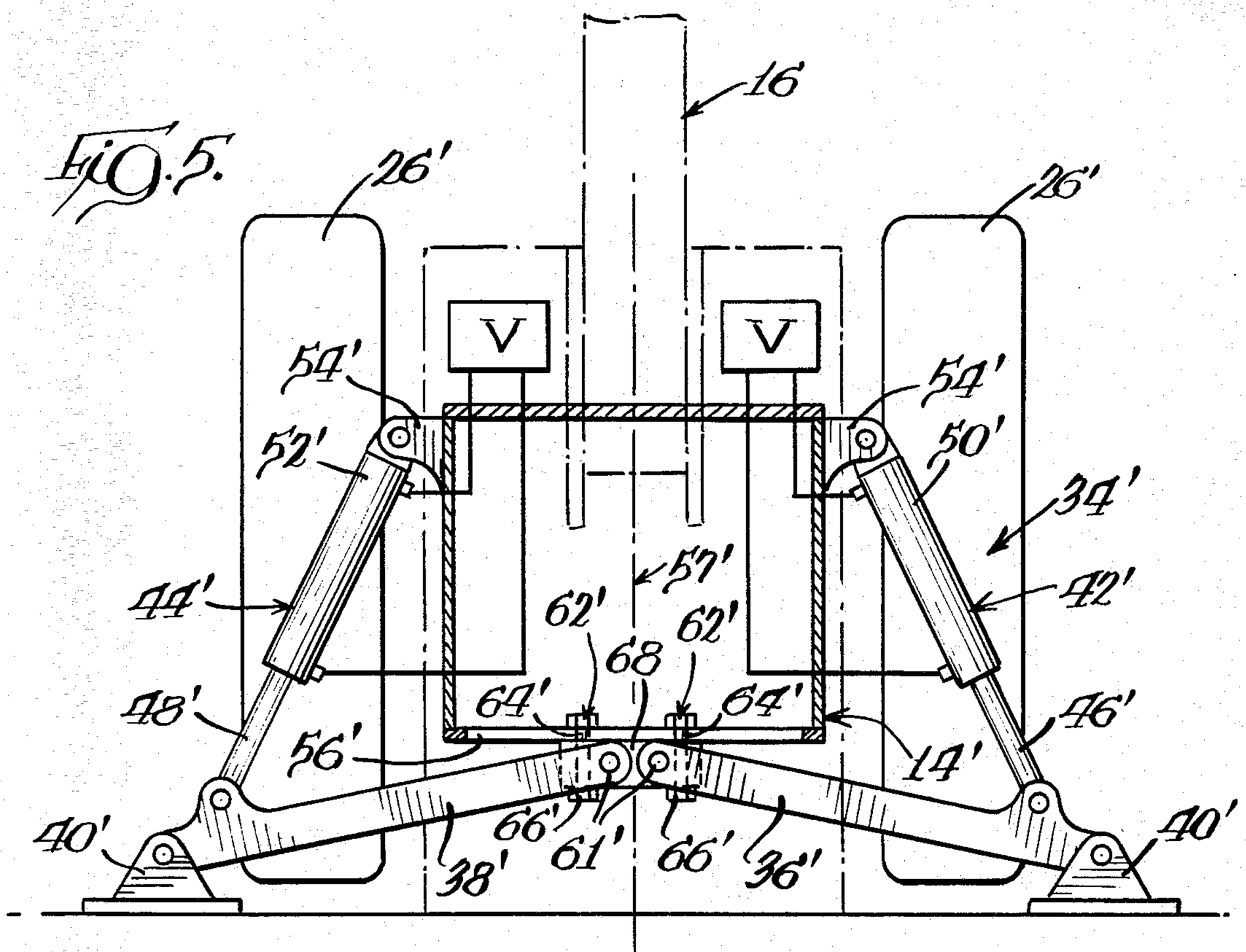
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Fig. 6.

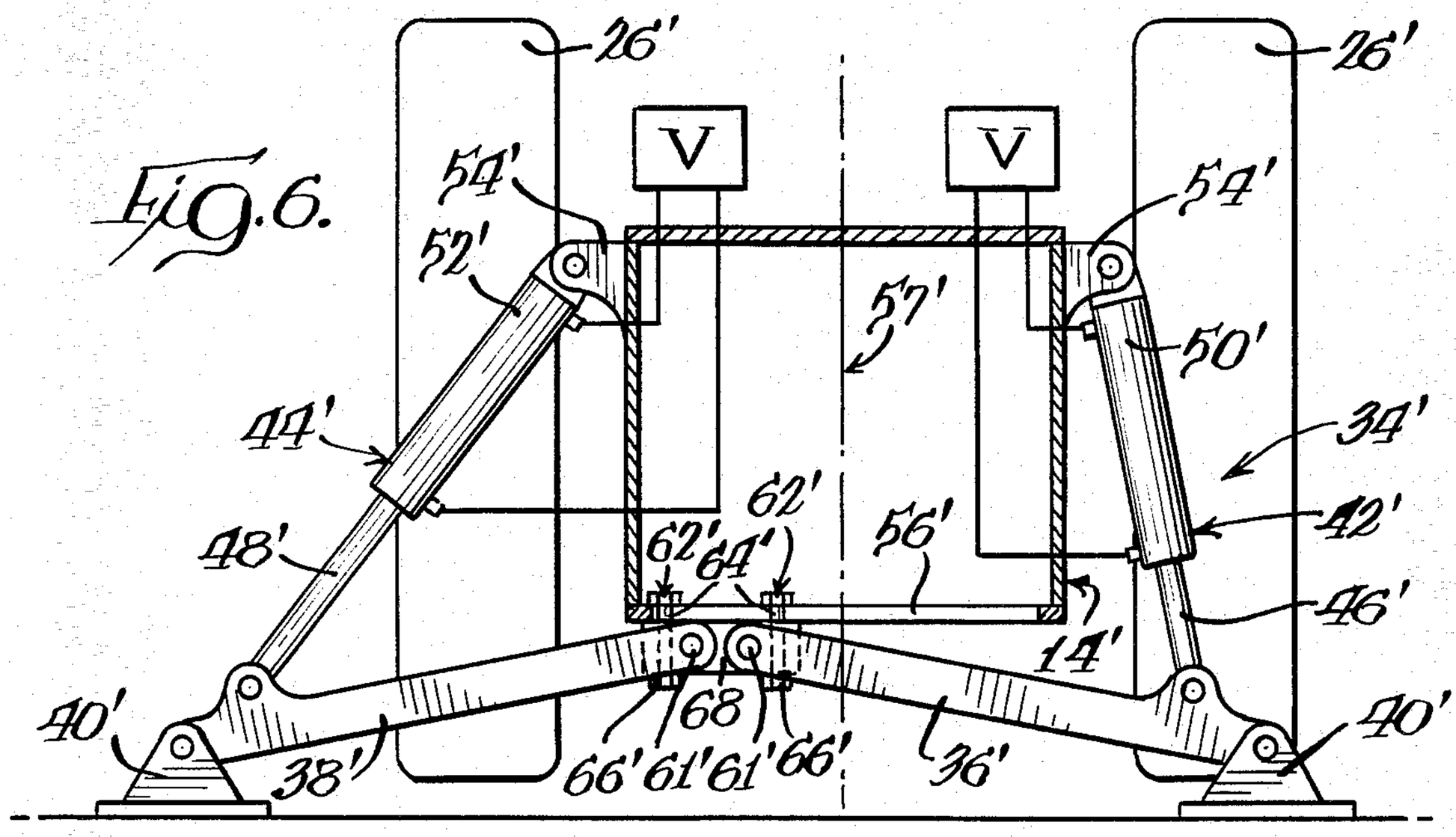
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Fig. 7.

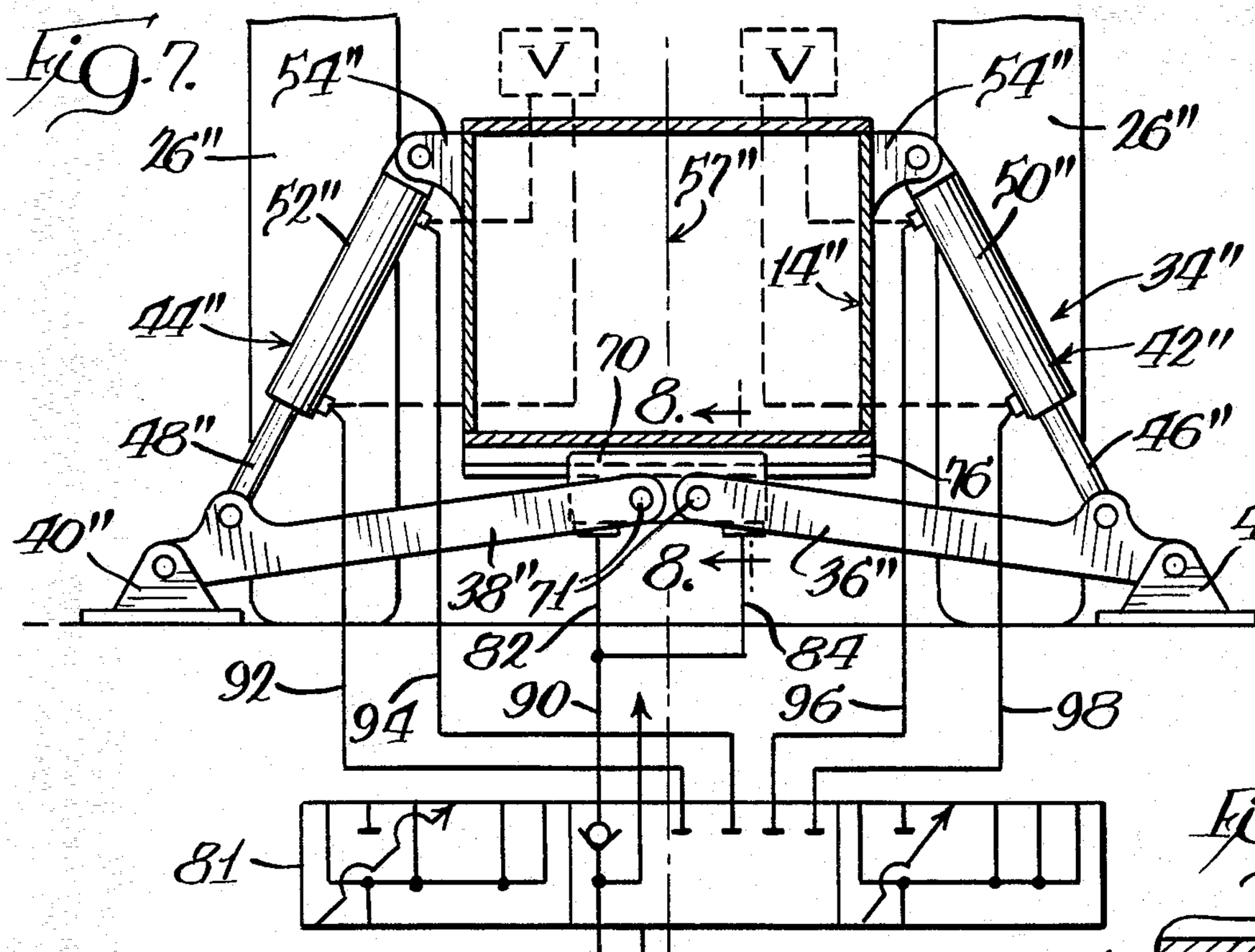

Fig. 8.

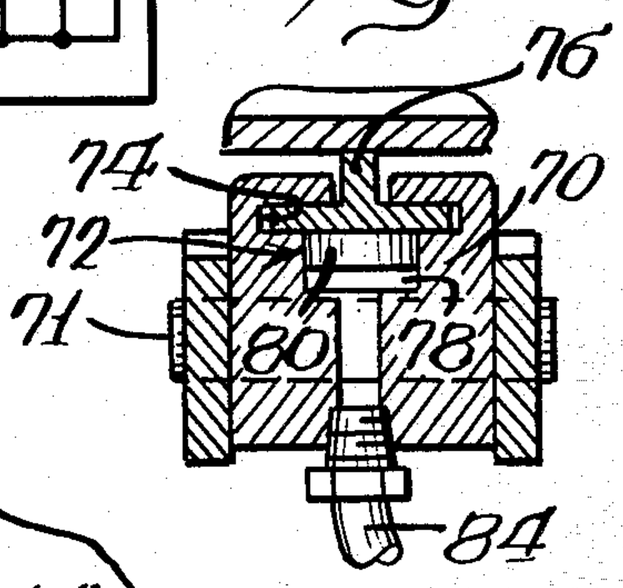

Fig. 9.

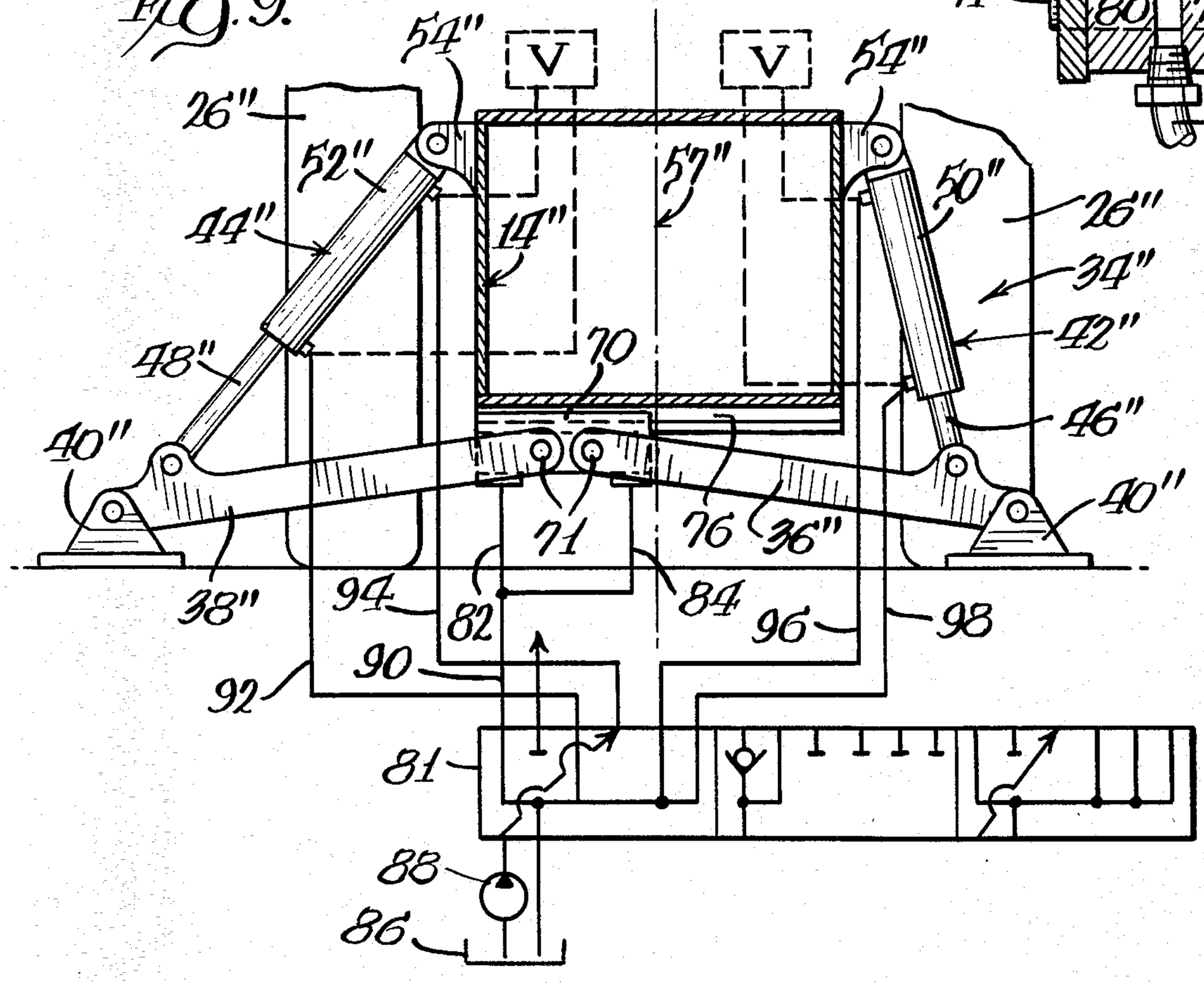

Fig. 10.

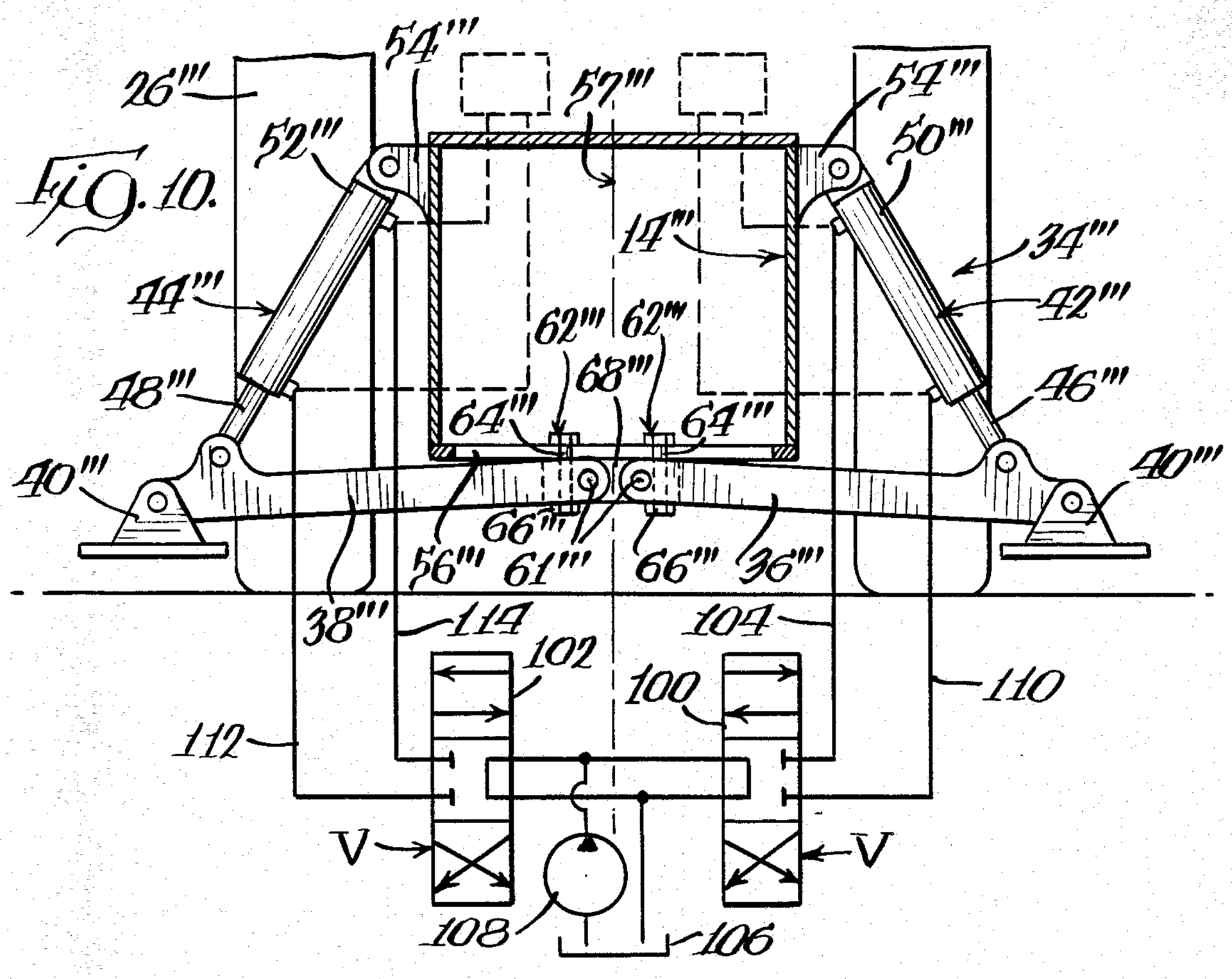
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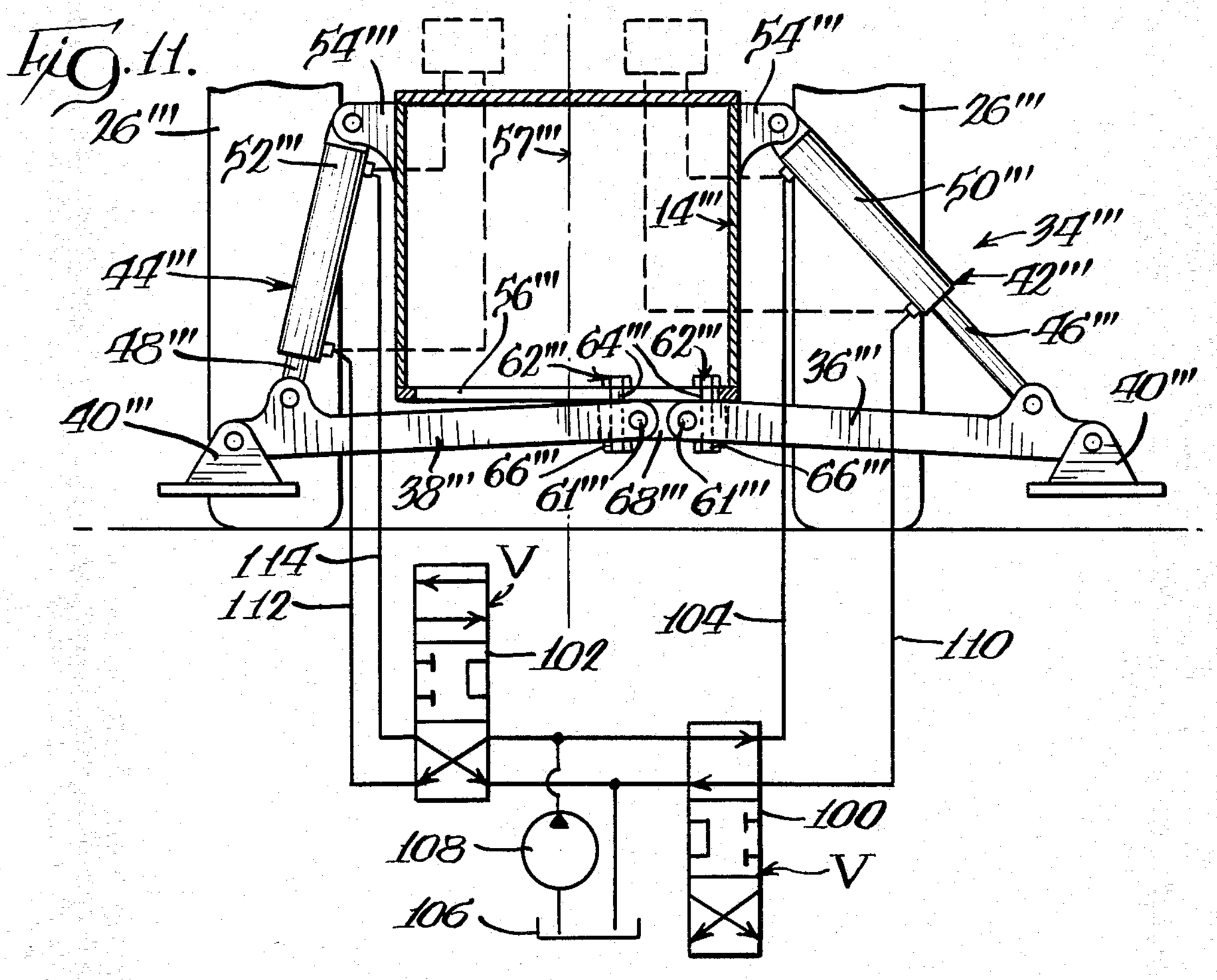
Fig. 11.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STABILIZER ASSEMBLY

BACKGROUND OF THE INVENTION

This invention relates to construction vehicles of the type having a material handling implement, and more particularly, to an improved stabilizer arm assembly for laterally supporting the vehicle and raising the wheels of the vehicle off the ground during operation of the material handling implement.

Many types of construction vehicles have stabilizer arms, or outriggers, which extend downwardly and outwardly from the frame sides during operation of their material handling implements, to engage the ground to laterally support the vehicle against tipping, and to anchor the vehicle to the ground by raising the wheels at the end of the vehicle having the material handling implement off the ground. For example, in a vehicle having a material handling implement, such as a backhoe, operatively connected to the rear end of the vehicle, a stabilizer arm is positioned generally adjacent and rearwardly of each of the rear wheels. It has also been found advantageous under some working conditions to mount stabilizer arms at the front end of the vehicle. U.S. Pat. Nos. 3,376,984; 3,951,281; 3,955,695; 4,026,428 and 4,286,803 disclose some typical arrangements of stabilizer arms.

A stabilizer arm typically has one end pivotally connected to the frame about a fixed stabilizer pivot point for movement between a ground engaging support position, extending laterally outward of the wheel, and a generally upright transport or storage position. To move the stabilizer arm between its support and transport positions and to apply a downward force on the stabilizer arm when in the support position to lift the vehicle off the ground, various power sources can be used. A common power source used in construction vehicles is a fluid ram, such as a hydraulic cylinder and piston rod assembly. Usually, one end of the fluid ram is pivotally mounted to the frame of the vehicle about a fixed pivot axis and the other end operatively connected to the stabilizer arm.

The typical stabilizer arm when in its support position extends laterally outward of the longitudinal center line of the vehicle frame by a fixed distance. In most instances this distance is selected to provide adequate stability for the vehicle under most operating conditions. However, under certain operating conditions it has been found to be desirable to either increase or decrease the distance which the stabilizer arm extends outward of such longitudinal center line. For example, when the vehicle is working near an obstruction, such as a roadway or building, it is necessary to position the end of the stabilizer arm close to the wheel and nearer to such longitudinal center line and when the vehicle is operating on a hillside, or the material handling implement is sideshifted, it is desirable to position the end of the stabilizer arm farther from the wheel and the longitudinal center line than is possible with typical stabilizer arms.

It is therefore desirable to provide a stabilizer assembly which permits the selective positioning of the end of the stabilizer arm relative to the wheel and longitudinal center line of the vehicle frame. One such assembly is disclosed in U.S. Pat. No. 3,550,795. In this assembly the inboard end of the stabilizer arm is pinned to the frame in one of two preselected positions. In order to reposition the outboard end of the stabilizer arm it is necessary

that the operator manually repin the inboard end of the stabilizer arm. Further, this assembly only permits the positioning of the outboard end of the stabilizer arm in one of two positions. Under certain operating conditions it is desirable to precisely position the outboard end of the stabilizer arm in a specific relationship to the vehicle wheel.

SUMMARY OF THE INVENTION

In accordance with the preferred embodiments of the present invention an improved stabilizer assembly is provided which permits selective positioning of the outboard ends of the stabilizer arms over a wide range of positions from a position immediately adjacent the vehicle wheels and nearer the longitudinal center line of the vehicle frame to a position substantially outside of the wheels and farther from the longitudinal center line of the vehicle frame. In all of the preferred embodiments the inboard ends of the stabilizer arms are pivotally secured to a stabilizer anchor which is transversely slidable relative to the vehicle frame. Various means are contemplated for positioning of the stabilizer anchor relative to the vehicle frame and for retaining the stabilizer anchor in such position.

In accordance with a first preferred embodiment of the invention, the inboard ends of the stabilizer arms are pivotally secured to separate stabilizer anchors which are slidably mounted to the vehicle frame so as to permit selective transverse movement thereof on either side of the longitudinal center axis of the vehicle frame and thereby position the outboard ends of the stabilizer arms nearer and farther from the longitudinal center line of the vehicle frame. The outboard ends of the stabilizer arms are raised and lowered by hydraulic stabilizer cylinders which extend between the stabilizer arms and the frame. Retaining means are provided to selectively secure the stabilizer anchor to the vehicle frame in a fixed relationship.

In accordance with second, third and fourth preferred embodiments of the invention, the inboard ends of the stabilizer arms are pivotally secured to a common stabilizer anchor which is slidably mounted to the vehicle frame so as to permit selective transverse movement thereof on either side of the longitudinal center line of the vehicle frame and thereby position the outboard end of one of the stabilizer arms nearer the longitudinal center line of the vehicle frame and the outboard end of the other stabilizer arm farther from such longitudinal center line. In all of these embodiments the outboard ends of the stabilizer arms are raised and lowered by stabilizer cylinders as in the first embodiment. In the second embodiment, the stabilizer anchor is transversely slidable relative to the vehicle frame and the vehicle frame is moved relative to the stabilizer anchor by use of the material handling implement while the rear wheels are raised above the ground by the stabilizer assembly. In the third embodiment, the stabilizer anchor is transversely slidable relative to the vehicle frame and the stabilizer cylinders are used to move the stabilizer anchor relative to the vehicle frame while the wheels and stabilizers are on the ground. The stabilizer anchor is slidable on a rail member secured to the vehicle frame and a hydraulic piston clamp associated with the stabilizer anchor selectively secures the stabilizer anchor to the frame. The fourth embodiment is similar to the second embodiment except that the stabilizer anchor is moved relative to the vehicle frame while the

stabilizer arms are in their raised positions above the ground by use of the stabilizer cylinders.

In all of the preferred embodiments of the invention, the movement of the stabilizer anchor relative to the longitudinal center line of the vehicle frame is effective to selectively position the outboard ends of the stabilizer arms nearer or farther from the longitudinal center line of the vehicle frame. In so doing, the vehicle may be operated in a safe and reliable manner under a wide variety of operating conditions.

Other advantages and features of the present invention will be apparent from the following detailed description of the preferred embodiments of the invention, from the claims and from the accompanying drawings in which each and every detail shown is fully and completely disclosed as a part of this specification in which like numerals refer to like parts.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a wheeled construction vehicle having a stabilizer assembly constructed in accordance with principles of the present invention;

FIG. **2** is a sectional view taken along line **2—2** in FIG. **1** showing a first embodiment of the stabilizer assembly with the stabilizers in a normal lowered position in contact with the ground;

FIG. **3** is a sectional view similar to FIG. **2** showing the first embodiment of the stabilizer assembly with the stabilizers in a retracted raised position above the ground;

FIG. **4** is a sectional view similar to FIG. **2** showing the first embodiment of the stabilizer assembly with the stabilizers in a extended lowered position in contact with the ground;

FIG. **5** is a sectional view similar to FIG. **2** showing a second embodiment of the stabilizer assembly with the stabilizers in a normal lowered lifting position in contact with the ground, with the wheels raised above the ground;

FIG. **6** is a sectional view similar to FIG. **5** showing the second embodiment of the stabilizer assembly with one of the stabilizers in a lowered extended position in contact with the ground and the other stabilizer in a lowered retracted position in contact with the ground, with the wheels raised above the ground;

FIG. **7** is a sectional view similar to FIG. **2** showing a third embodiment of the stabilizer assembly with the stabilizers in a normal lowered position in contact with the ground, and a schematic representation of a hydraulic control circuit in its neutral position;

FIG. **8** is a sectional view taken along line **8—8** in FIG. **7** showing the details of a hydraulic piston clamp;

FIG. **9** is a sectional view similar to FIG. **7** showing a third embodiment of the stabilizer assembly with one of the stabilizers in a lowered extended position in contact with the ground and the other stabilizer in a lowered retracted position in contact with the ground, and a schematic representation of the hydraulic control circuit in its operative position;

FIG. **10** is a sectional view similar to FIG. **2** showing a fourth preferred embodiment of the $tabilizer assembly with the stabilizers in a raised normal position above the ground, and a schematic representation of a hydraulic control circuit in its neutral position; and

FIG. **11** is a sectional view similar to FIG. **10** showing the fourth preferred embodiment of the stabilizer assembly with one of the stabilizers in a raised extended position above the ground and the other stabilizer in a raised retracted position above the ground, and a schematic representation of the hydraulic control circuit in its operative position.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings, and will herein be described in detail, four presently considered preferred embodiments of the invention, with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the specific embodiments illustrated.

FIG. **1** illustrates a wheeled construction vehicle **10** of the type commonly referred to as a "loader/-backhoe" or "backhoe". Vehicle **10** includes a frame or chassis **14**, a backhoe unit or first material handling implement **16** operatively connected to and supported on rear end **18** of frame **14** and a loader unit or second material handling implement **20** operatively connected to and supported on front end **22** of frame **14**. One type of backhoe unit **16** that can be used in construction vehicle **10** is shown and described in Long U.S. Pat. No. 3,047,171 and a loader unit **20** that can be used with construction vehicle **10** is shown and described in Shumaker, U.S. Pat. No. 4,026,428.

A pair or set of front steering wheels **24** and rear driving wheels **26** accomodate movement of vehicle **10** and dynamically support frame **14** during movement of vehicle **10**. Frame **14** has one side **30** and an opposed side (not shown) with front end **22** and rear end **18** extending laterally between and connecting one opposed side **30** to the other. An operator's compartment **32** is supported on frame **14** between opposed sides **30** and between rear end **18** and front end **22**.

In order to provide lateral stabilization for vehicle **10** and to lift rear wheels **26** off the ground during operation of backhoe unit **16**, a stabilizer assembly **34** is mounted to frame **14**. Stabilizer assembly **34** includes a pair of stabilizer arms **36** and **38** which extend transversely outward from frame **14** and have stabilizer pads **40** pivotally connected to the outboard ends thereof. The inboard ends of stabilizer arms **36** and **38** are pivotally connected to frame **14** in accordance with the present invention and will, accordingly, be discussed in further detail hereinbelow. The outboard ends of stabilizer arms **36** and **38**, and the pads **40** attached thereto, are raised and lowered with respect to the ground by a pair of stabilizer cylinders **42** and **44**. As seen in all the figures, the respective piston rod portions **46** and **48** of cylinders **42** and **44** are respectively pivotally connected to the stabilizer arms **36** and **38** adjacent the outboard ends thereof and the hydraulic cylinder portions **50** and **52** of cylinders **42** and **44** are respectively pivotally connected to corresponding ears **54** welded to upper portions of frame **14** on either side thereof. The extension and retraction of the rod portions **46** and **48** relative to corresponding cylinder portions **50** and **52** are effective to respectively lower and raise the stabilizer pads **40** relative to the ground between ground engaging and lifting positions in contact with the ground and transport positions above the ground. In some circumstances it may be desirable to have one or more auxiliary stabilizer arms mounted adjacent front end **22** of vehicle **10**.

Referring to FIGS. **2**, **3** and **4**, a first preferred embodiment of the stabilizer assembly incorporating the

principles of the present invention is illustrated in various operating positions and indicated by the numeral **34**. Stabilizer assembly **34** includes stabilizer arms **36** and **38**, stabilizer cylinders **42** and **44** and stabilizer pads **40** constructed and mounted as hereinabove described. A pair of transversely extending slots **56** (only one of which is shown) are formed in a lower portion of frame **14**, which extend on both sides of the longitudinal center line of the frame **14**, indicated at **57**. The slots **56** are longitudinally spaced a short distance apart. The inboard ends of stabilizer arms **36** and **38** are respectively pivotally connected to stabilizer anchors **58** and **60** through pins **61**. Anchors **58** and **60** are mounted to frame **14** in a suitable manner by fastening means **62** which permits them to transversely slide relative to a corresponding slot **56** on either side of the center line **57**. One embodiment of the fastening means **62** includes a threaded bolt **64** which extends through the slot **56** and a corresponding anchor **58** or **60** and receives a nut **66**. The dimension of the body of bolt **64** is such as to permit transverse movement thereof within slot **56** when the nut **66** is loosened. The tightening of nut **66** applies a clamping pressure between the corresponding anchor **58** or **60** and the frame **14** to preclude the movement of the anchor **58** or **60** relative to the frame **14**.

The operation of the stabilizer assembly **34** will now be described. Referring to FIG. **3**, the stabilizer assembly **34** is shown in what is called its retracted raised position, which position is used when the stabilizer assembly is not operative, such as during transport of vehicle **10**. In this position the rod portions **46** and **48** are retracted into cylinder portions **50** and **52** of the stabilizer cylinders **42** and **44** and the anchors **58** and **60** are retained in position adjacent the ends of the slots **56** on opposite sides of the center line **57**. As such, the pads **40** are raised above the ground and positioned nearer to the center line **57** generally in longitudinal alignment with a corresponding wheel **26**.

Under normal operating conditions of the vehicle **10** on relatively flat ground with no working obstructions present, the stabilizer assembly is moved into its normal lowered position, as shown in FIG. **2**. In order to move assembly **34** from its position shown in FIG. **2** to its position shown in FIG. **3**, the nuts **66** are loosened and the anchors **58** and **60** are manually slid towards center line **57**, while the rod portion **46** and **48** are extended from corresponding cylinder portions **50** and **52** by operation of the valves which control the cylinders. Depending upon the geometry of the various elements of assembly **34**, it may be necessary to intermittently extend the rod portions **46** and **48** and move the anchors **58** and **60** until the desired positions are reached. The nuts **66** are tightened to retain anchors **58** and **60** in place prior to operation of the vehicle **10**. As will be noted from FIG. **2**, the pads **40** are in contact with the ground and positioned a short distance outside of the wheels **26**.

When it is necessary to operate vehicle **10** either on a hillside or near an obstruction, the stabilizer pads **40** may be selectively positioned either nearer or farther from the center line **57**. Referring to FIG. **4**, the stabilizer assembly **34** is shown with both of the stabilizer pads **40** in an extended position farther from the center line **57**. In order to attain this position the procedure as disclosed above is utilized except that the anchors **58** and **60** are positioned adjacent the ends of slots **56** on the same side of the center line **57** as their corresponding stabilizer arm **36** or **38**. When in this position maximum stability is provided to vehicle **10**. When one or both sides of the vehicle **10** are required to operate adjacent an obstruction, one or both of the stabilizer pads may be retained in the position shown in FIG. **3** and the corresponding rod portions **46** and **48** are extended to move the pad **40** into contact with the ground generally in longitudinal alignment with the wheel **26**. In so doing the stabilizer assembly **34** may be utilized even when the vehicle is next to an obstruction such as a building.

Referring now to FIGS. **5** and **6**, a second preferred embodiment of a stabilizer assembly incorporating the principles of the present invention is illustrated in two operating positions and identified by the numeral **34'**. The structural elements of the second embodiment **34'**, which are common to the first embodiment, are identified by the same reference numeral followed by a single prime sign and the hereinabove discussion relative to these common elements will not be repeated. In this embodiment, the inboard ends of stabilizer arms **36'** and **38'** are pivotally mounted to a common stabilizer anchor **68** which is slidably movable relative to a single slot **56'** formed in frame **14'**, in a similar manner as in the first embodiment, by a pair of fastener assemblies **62'**.

Referring to FIG. **5**, the material handling implement **16** is shown schematically in phantom lines in contact with the ground. The stabilizer assembly **34'** is in its normal lowered position with the wheels raised above the ground by the stabilizer assembly **34'**. In accordance with this embodiment, since there is a common anchor **68** for both pads **40'**, the pads **40'** move in the same direction, one towards the center line **57'** and the other way from the center line **57'**. Referring to FIG. **6**, the stabilizer assembly **34'** is in a position with one of the pads **40'** in an extended position and the other pad **40'** in a retracted position.

The method of operation of the stabilizer assembly **34'** will now be described. In contrast to the operation of the stabilizer assembly **34**, wherein the vehicle wheels **26'** are on the ground and the anchors move relative to the ground, in the operation of stabilizer assembly **34'** the vehicle wheels **26'** are raised off the ground by the stabilizer assembly **34'** and the rear end of the vehicle frame **14'** is moved relative to the ground. More specifically, with the stabilizer assembly **34'** positioned as in FIG. **5**, the nuts **66'** are loosened and the rear end of the vehicle frame **14'** is transversely moved relative to the anchor **68**. In cooperation with the movement of the frame **14'**, it is necessary to extend the piston portion **48'** and retract the piston portion **46'**, by use of control valves V, to prevent the vehicle **10** from tipping too far from its level position. As the rear end of the frame **14'** moves relative to the ground the anchor **68** slides within slot **56'** towards one end thereof. In accordance with one aspect of the invention the material handling implement **16'**, i.e. the backhoe, is utilized to so move the frame **14'** by urging the backhoe into contact with the ground in a manner which creates a resultant force to transversely move the rear end of the frame **14'** in the desired direction. Upon orienting the stabilizer assembly **34'** into its desired position, the nuts **66** are tightened and the wheels **26'** may be lowered to the ground by operation of the stabilizer cylinders **42** and **44**.

Referring now to FIGS. **7**, **8** and **9**, a third preferred embodiment of a stabilizer assembly incorporating the principles of the present invention is illustrated in two operating positions and is identified by the numeral **34''**.

The structural elements of the third embodiment **34''**, which are common to the first and second embodiments, are identified by the same reference numeral followed by a double prime sign and the hereinabove discussion relative to these common elements will not be repeated. In this embodiment, the inboard ends of stabilizer arms **36''** and **38''** are pivotally mounted to a common stabilizer anchor **70**, by pins **71**, which is in turn slidably mounted to the frame **14''**. This embodiment hydraulically positions the stabilizer arms **36''** and **38''** by use of the stabilizer cylinders **42''** and **44''** and hydraulically clamps the anchor **70** to the frame **14''** by use of piston clamps **72**.

As best seen in FIG. **8**, anchor **70** is formed with a transversely extending T-shaped recess **74** in facing relationship to the underside of frame **14''**. The underside of frame **14''** is provided with a transversely extending T-shaped rail **76** which is slidably received in recess **74**. A pair of cylinder chambers **78**, only one of which is shown, having hydraulic pistons **80** positioned therein, are provided in anchor **70** in direct communication with recess **74**. The lower ends of the chambers **78** are in communication with a source of pressurized hydraulic fluid, in a manner well known in the art. The pistons **80** are movable within the chamber **78** between a raised or clamping position in contact with the rail **76** upon the pressurization of the chambers **78** and a lowered or released position upon the release of pressure from the chambers **78**. In essence the pistons **80** serve as a means to selectively brake or lock the anchor **70** in a fixed position relative to the frame **14''**.

Referring to FIGS. **7** and **9**, a schematic representation of a hydraulic control system is shown to operate the piston clamps **72** and the stabilizer cylinders **42''** and **44''**. The control system includes a three position valve spool **81**. Valve spool **81** has a central position, shown in FIG. **7**, wherein the conduits **82** and **84** leading to the respective chambers **78** are in communication with the pressurized fluid from tank **86** through pump **88** and conduit **90** and the respective conduits **92**, **94**, **96** and **98** of the stabilizer cylinders **42''** and **44''** are closed off to maintain the fluid pressure in the cylinders. With the valve spool **81** in this position, the chambers **78** are pressurized urging the pistons **80** into contact with rail **76** and thus retaining anchor **70** in a fixed position relative to frame **14''**. The other two positions of the valve spool **81** will be discussed immediately hereinbelow.

The operation of the stabilizer assembly **34''** will now be discussed. Referring to FIG. **7**, the vehicle wheels **26''** are in contact with the ground and the stabilizer assembly **34''** is shown in a normal lowered position in contact with the ground. When in this position the anchor **70** is centrally disposed on rail **76** through the center line **57''** of the frame **14''**. Further, the valve spool **81** is in its central position which, as discussed above, maintains the anchor **70** rigidly affixed to rail **76** and the stabilizer cylinders **42''** and **44''** in a fixed relationship. The control valves V, and a conventional hydraulic circuit associated therewith, are utilized to raise and lower the outboard ends of stabilizer arms **36''** and **38''** to raise and lower the pads **40''** between their transport positions and their operative positions.

As was the case with the stabilizer assembly **34'**, under certain operating conditions it is desirable to reposition the anchor **70** on one side or the other of center line **57''** so as to move one of the pads **40''** nearer to its corresponding wheel **26''** and the other pad **40''** farther from its corresponding wheel **26''**, as so seen in FIG. **9**. In order to so reposition the various elements of stabilizer assembly **34''**, the valve spool **81** is shifted to the right into one of its operating positions. By so doing, the fluid pressure in conduits **82**, **84**, and **90** is relieved to the reservoir **86** which relieves the fluid pressure in the chambers **78** causing the pistons **80** to withdraw from contact with rail **76**. This permits the anchor **70** to transversely slide on rail **76** relative to the center line **57''**. With the valve spool **81** so positioned, the fluid pressure in the conduits **96** and **98** is relieved to the reservoir **86**, relieving the pressure in stabilizer cylinder **42''**, and permitting rod portion **46''** to freely extend and retract relative to cylinder portion **50''**. Also, the fluid pressure in conduit **92** is relieved to reservoir **86** relieving the fluid pressure on the rod end of stabilizer cylinder **44''** and the conduit **94** is moved into communication with pump **88** which maintains fluid pressure on the cylinder end of stabilizer cylinder **44''**. Accordingly, the rod portion **48''** is caused to extend from cylinder portion **52''** which results in a force with a horizontal component sufficient to slide anchor **70** to the left and simultaneously move the outboard end of stabilizer arm **38''**, and the pad **40''** attached thereto, farther from the center line **57''**. At the same time the rod portion **46''** is caused to retract into cylinder **50''** and the outboard end of stabilizer arm **36''**, and the pad **40''** attached thereto, are moved nearer to the center line **57''**. At such time as the elements are positioned as desired, the valve spool **81** is moved back in its central position which activates piston clamps **72** to retain anchor **70** in a fixed position. As will be apparent from the control circuit schematic, the other position on the valve spool **81** is utilized to move the anchor **70** to the other side of the center line **57''** in the same manner as immediately hereinabove discussed.

Referring now to FIGS. **10** and **11**, a fourth preferred embodiment of the stabilizer assembly incorporating the principles of the present invention is illustrated in two operating positions and is identified by the numeral **34'''**. The structural elements of the fourth embodiment **34'''**, which are common to the other embodiments, are identified by the same reference numeral followed by a triple prime sign and the hereinabove discussion relative to these common elements will not be repeated. In this embodiment, the construction of stabilizer assembly **34'''** is substantially the same as disclosed with regards to the stabilizer assembly **34'**, as shown in FIGS. **5** and **6**. Although not discussed with regards to the other embodiments, the hydraulic control valve circuit which is shown in FIGS. **10** and **11** is typical of the control valve circuit V which may be used to control the stabilizer cylinders in all of the embodiments and will now be briefly discussed in regards to the operation of stabilizer assembly **34'''**. The control valve circuit V includes a pair of valve spools **100** and **102** which respectively control the operation of the stabilizer cylinders **42'''** and **44'''**. The valve spools **100** and **102** each have three positions; one position provides fluid pressure to the rod end of the cylinder portions **50'''** or **52'''** while relieving the pressure from the other end, another position relieves fluid pressure from the rod end of the cylinder portions **50'''** or **52'''** while providing pressure to the other end; and the third position is a neutral position which maintains the pressure in both ends of the cylinder portions **50'''** or **52'''**. It can thus be seen that by control of the valve spools **100** and **102** the extension and retraction of the rod portions **46'''** and **48'''** relative to the corresponding cylinder portions **50'''** and **52'''** can

be selectively controlled. This control arrangement is contemplated for use in any of the embodiments of the invention disclosed herein to raise and lower the outboard ends of the stabilizer arms, and the stabilizer pads attached thereto, relative to the ground.

Although the stabilizer assembly **34'''** is of similar construction to stabilizer assembly **34'** the method of operation of same is quite different. With regards to assembly **34'** the wheels **26'** are raised off ground and the frame **14'** is transversely moved relative to the ground, while in assembly **34'''** the wheels **26'''** remain on the ground and the anchor **68'''** is transversely moved relative to the ground. Referring to FIG. **10**, the stabilizer assembly **34'''** is shown in its normal raised position and the valve spools **100** and **102** are in their neutral positions. As with the other embodiments, under certain operating conditions it is desirable to move stabilizer assembly **34'''** to the position shown in FIG. **11**. This is accomplished by loosening nuts **66'''** to permit anchor **68'''** to transversely move in slot **56'''**. The valve spool **100** is moved into the position wherein the cylinder end of cylinder portion **50'''** is pressurized through conduit **104** with fluid from reservoir **106** and pump **108** while the rod end of cylinder portion **50'''** is relieved of fluid through conduit **110**, which is effective to extend rod portion **46'''** from cylinder portion **50'''**. At the same time, the valve spool **102** is moved into the position wherein the rod end of cylinder portion **52'''** is pressurized through conduit **112** with fluid from reservoir **106** and pump **108** while the cylinder end of cylinder portion **52'''** is relieved of fluid through conduit **114**, which is effective to retract rod portion **48'''** into cylinder portion **52'''**. The net result of such movement of the stabilizer cylinders **42'''** and **44'''** is to urge the anchor **68'''** to the right and thereby move the outboard end of stabilizer arm **36'''** farther from the center line **57'''** and move the outboard end of stabilizer arm **38'''** nearer to the center line **57'''**. During such movement of the stabilizer cylinder **42'''** it may be necessary for the operator to periodically meter the fluid flow through conduit **110** to prevent the pad **40'''** from touching the ground by manipulation of valve spool **100**. Upon reaching the desired position, the valve spools **100** and **102** are moved into their neutral positions and the nuts **66'''** are tightened. The valve spools may then be appropriately positioned to extend the rod portions **46'''** and **48'''** and thereby move the pads **40'''** into contact with the ground.

It will be understood that various departures from the specifically disclosed embodiments of the invention may be effected without departing from the principles of the invention. For example, various alternative clamping means may be employed to selectively retain the stabilizer anchor in a fixed relationship to the vehicle frame and alternative arrangement may be utilized to effect the sliding connection of the stabilizer anchor to the vehicle frame. Further, it will be understood that the invention is not strictly limited in its application to a backhoe type of vehicle, but is similarly applicable to other types of mobile equipment wherein similar problems are encountered as, for example, in boom cranes, power shovels, and the like. It is intended that the appended claims cover all such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. In a mobile heavy vehicle having a frame with a load lifting boom, an improved stabilizer assembly having a pair of stabilizers positioned one on each side of the vehicle to provide stabilization against tipping of the vehicle comprising: an anchor for stabilizing each of said stabilizers, means mounting each of said anchors to a lower portion of said frame so as to permit selective transverse positioning thereof on either side of the longitudinal center line of the vehicle including cooperating slot means defined by said frame and retaining means for positively positioning each anchor relative to the frame in a preselected position on either side of said longitudinal center line; first and second stabilizer legs having inboard ends which are pivotally secured to its respective stabilizer anchor and outboard ends which are respectively pivotally secured to first and second stabilizer pads; first and second stabilizer cylinders having first ends which are pivotally secured to upper portions of said frame, one on each side of said longitudinal center line, and second ends which are respectively pivotally secured to said first and second stabilizer legs for selectively moving the outboard ends of said stabilizer legs between raised and lowered positions, wherein said transverse positioning of said stabilizer anchors permits positioning of said first and second stabilizer pads between a retracted position nearer said longitudinal center line and an extended position farther from said longitudinal center line.

2. The invention as defined in claim **1** wherein each said retaining means comprises a threaded fastener which extends through each said stabilizer anchor and each said transverse slot means.

3. The invention as defined in claim **1** further including hydraulic means for positioning each said stabilizer anchor on either side of said longitudinal center line.

4. In a mobile heavy vehicle having a frame with a load lifting boom, an improved stabilizer assembly having a pair of stabilizers positioned one on each side of the vehicle to provide stabilization against tipping of the vehicle; comprising: a stabilizer anchor slidably mounted on a transverse rail member secured to a lower portion of said frame so as to permit selective transverse positioning thereof on either side of the longitudinal center line of the vehicle; first and second stabilizer legs having inboard ends which are pivotally secured to said stabilizer anchor and outboard ends which are respectively pivotally secured to first and second stabilizer pads; first and second stabilizer cylinders having first ends which are pivotally secured to upper portions of said frame, one on each side of said longitudinal center line, and second ends which are respectively pivotally secured to said first and second stabilizer legs for selectively moving the outboard ends of said stabilizer legs between raised and lowered positions; and retaining means including a hydraulic clamp means including a clamp piston associated with said stabilizer anchor for clamping the stabilizer anchor to said rail member for selectively retaining said stabilizer anchor in a preselected position on either side of said longitudinal center line, wherein said transverse positioning of said stabilizer anchor permits positioning of said first and second stabilizer pads between a retracted position nearer said longitudinal center line and an extended position farther from said longitudinal center line.

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